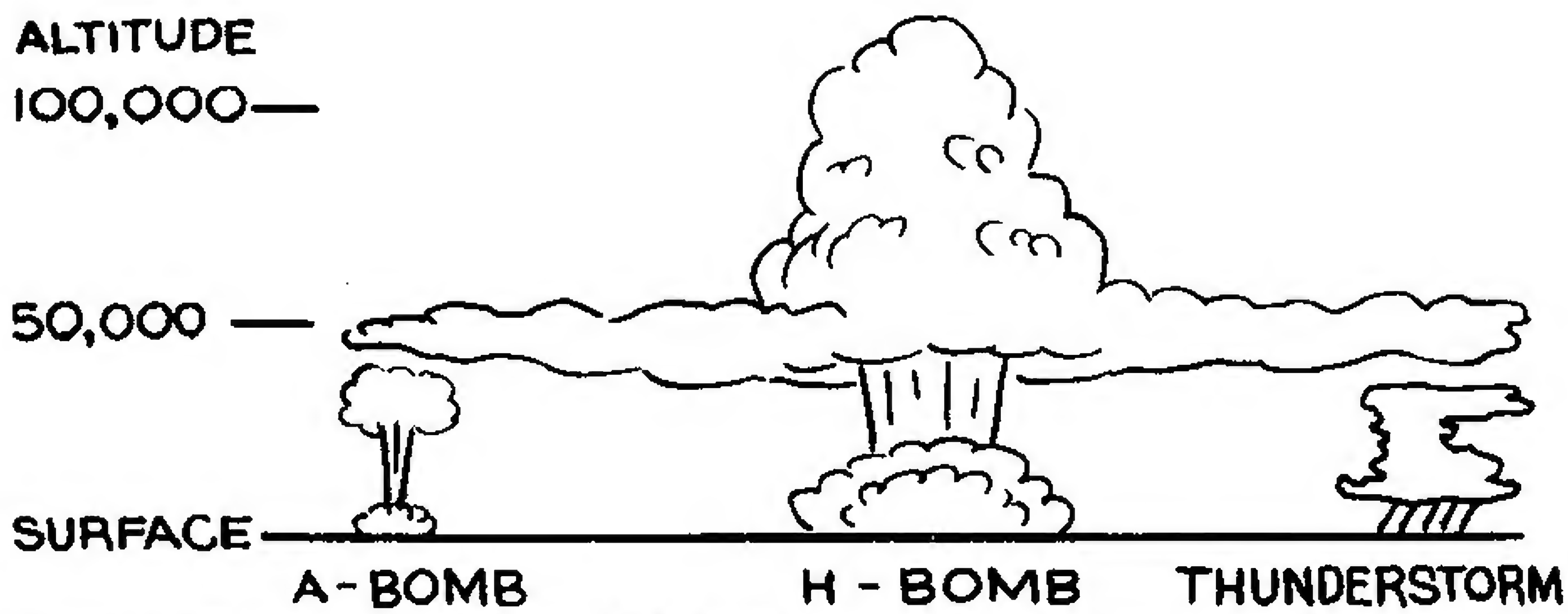


Figure 1 - Comparative Size of A-bomb mushroom, H-bomb mushroom, and ordinary thunderstorm cloud

How Nuclear Fission CAN AFFECT YOU . . .

by J. F. Wallace

the atomic bomb • the hydrogen bomb

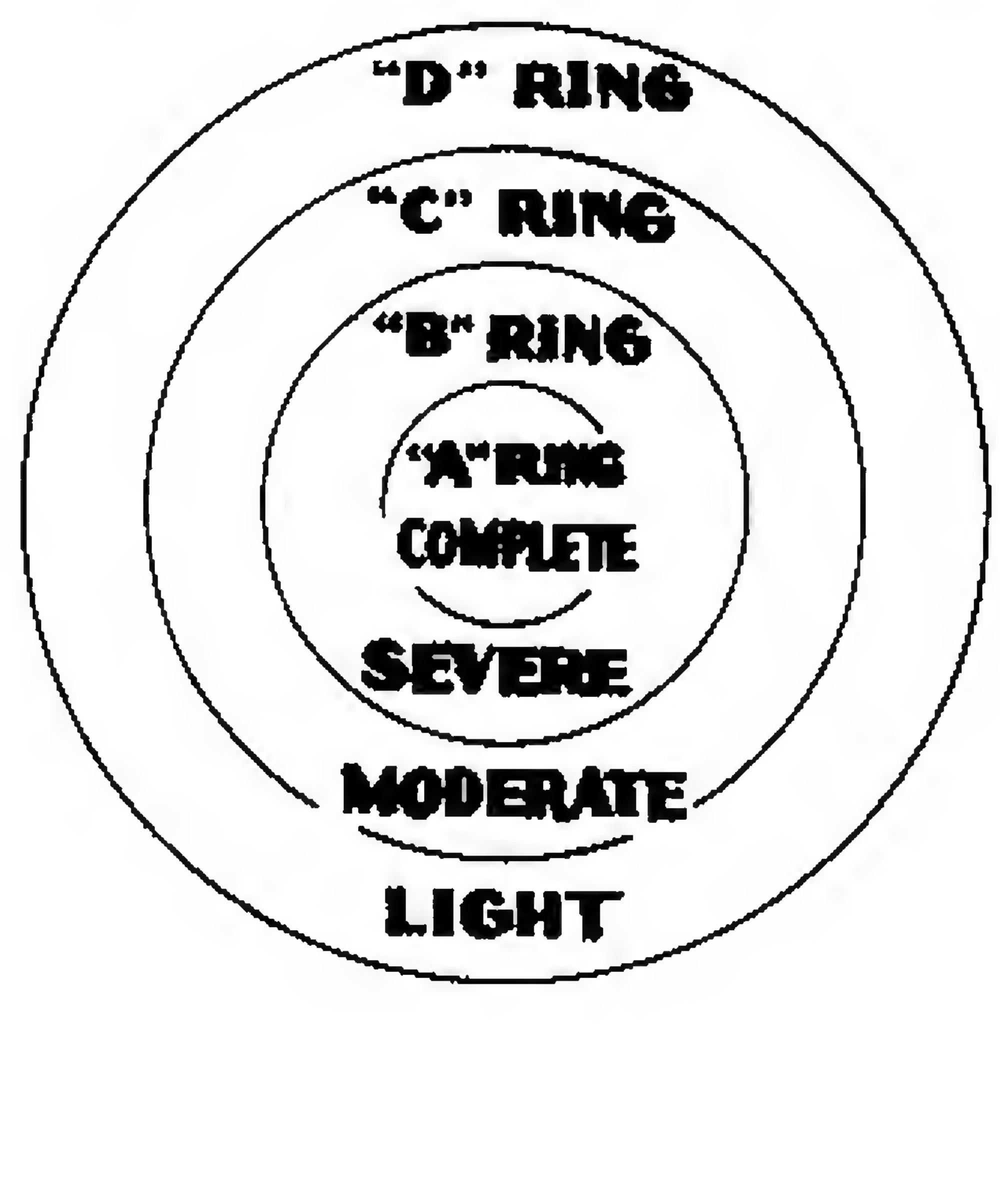
THE YEAR 1954 ushered in a new era in defensive planning. In that year it was announced that the United States had exploded an H-bomb. This was followed shortly thereafter by a statement that Russia, too, had also exploded one. Within ten years of the close of World War II the explosive force of a single bomb had increased 500,000 times. The explosive force of one bomb was greater than the total explosive force of all the bombs exploded by the Allies over Germany during the last war.

Coincident with the development of the hydrogen bomb was the extension of the North American continental early warning system. This made it possible to provide Canadian cities with at least three hours of warning impending attack by air. This latter development now makes practical any proposals to evacuate major communities in Canada in the event of threatened air attack.

The first part of this article will describe the effects of atomic bombs while the second part will propose a plan for the survival of most Canadians in the event of a third world war.

When an atomic bomb or hydrogen bomb explodes, the contents are transformed into a white hot fireball of gas which releases energy in the form of heat, light, air blast and radioactivity. As this fireball expands and cools, it shoots upward to many thousands of feet, giving the appearance of a huge mushroom. The size of the cloud and its height depends on the explosive yield of the weapon and how close to the ground it was exploded.

Damage pattern resulting from air blast heat and direct exposure to radiation takes a rather circular pattern about the hub of the explosion.



HEAT AND LIGHT EFFECTS

As the bomb explodes heat and light waves are radiated outwards in all directions. These waves are known as "heat flash" and travel with the speed of light. Heat intensity is such that it can set instantaneous fires and cause severe skin burns to humans. In atomic tests it has been proven conclusively that poor housekeeping such as unpainted buildings and trash provide this heat flash with an ideal feeder to start fires. The following illustration indicates the danger range of the heat flash:

Hydrogen bomb
Explosive yield
of 5,000,000 tons TNT

3rd degree burns	6 mile radius
2nd degree burns	10 mile radius
1st degree burns	15 mile radius
inflammable materials	15 mile radius

GZ is the point on the ground directly under the point or detonation of Ground Zero.

BLAST EFFECTS

The blast wave takes the form of a pressure wave traveling at the speed of sound. It envelopes buildings causing them to collapse. For civil defense purposes blast damage to structure is classified as follows:

A class damage — buildings are totally collapsed or demolished.

B class damage — buildings are so badly damaged they could not be repaired.

C class damage — buildings would require major repairs before they would be habitable.

D class damage — buildings would be habitable after minor repairs.

Here is the damage which results from an explosion:

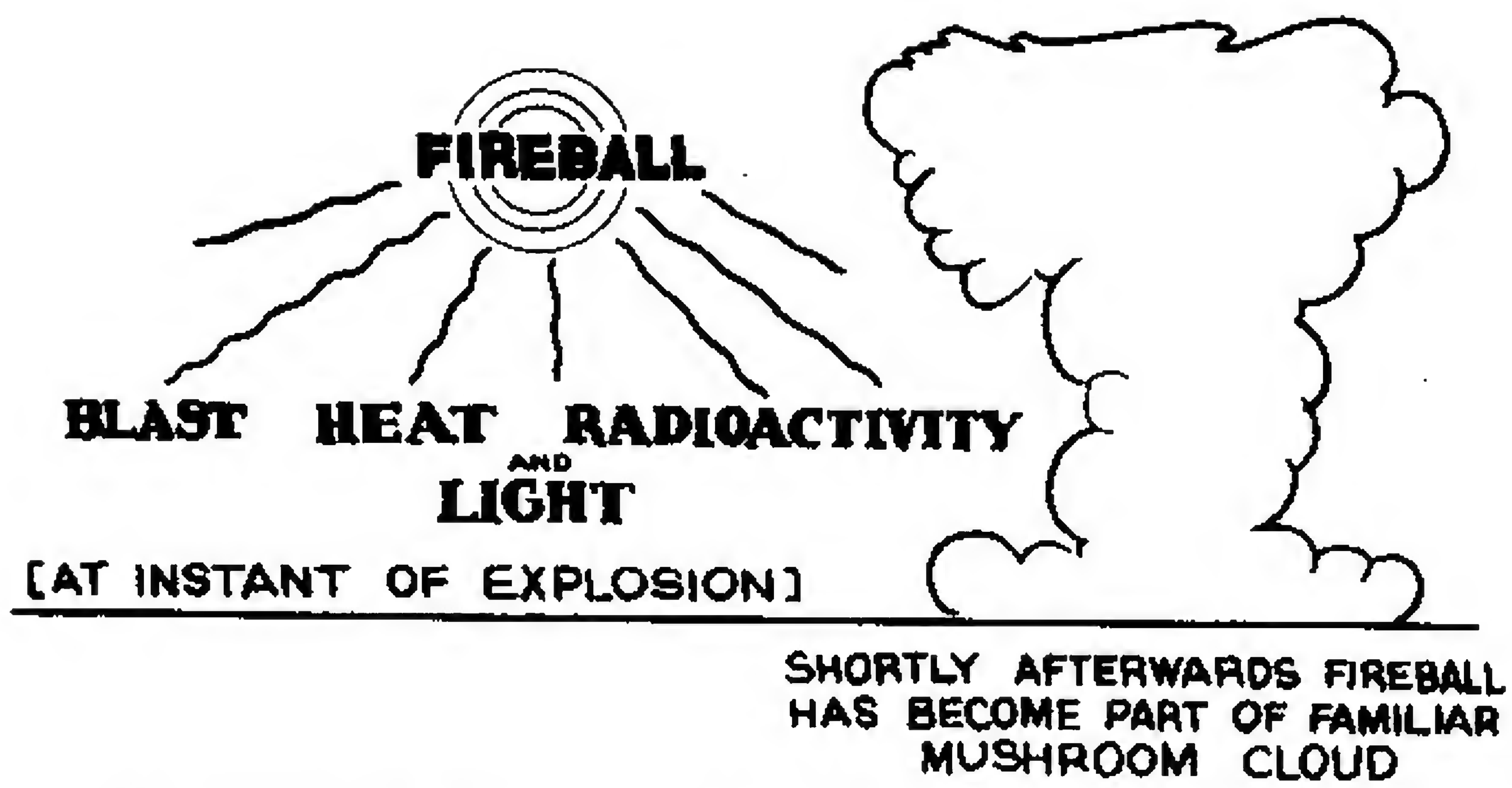
	Hydrogen bomb Explosive yield of 5,000,000 tons TNT
A class damage	3 mile radius
B class damage	6 mile radius
C class damage	9 mile radius
D class damage	12 mile radius

It can be assumed that 90% of unprotected people who were unfortunately located within the A and B rings of damage of any large atomic explosion would be either killed or seriously injured. Because approximately 80% of the population of most Canadian cities reside within this ring of damage it can be appreciated that the best place to be is as far away from the explosion as possible.

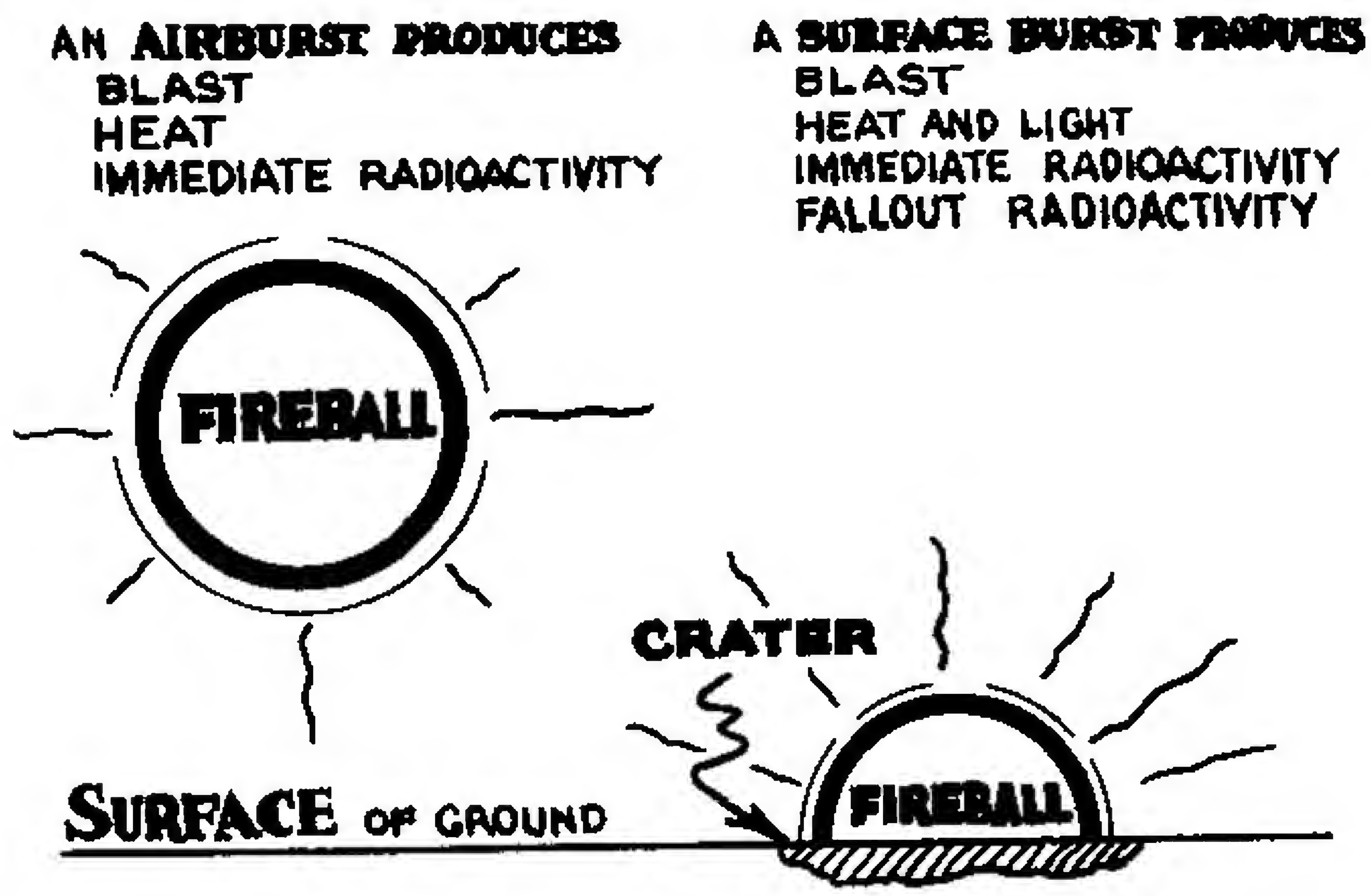
RADIOACTIVE EFFECTS

If an atomic bomb explodes so that the fireball does not touch the ground (an air burst), there is a radioactive effect which causes harm to people but which has no effect on buildings. It is called "immediate radioactivity." It travels in straight lines and after 90 seconds is no longer a hazard. For unprotected people it would be lethal within ¾ of a mile of the explosion of the atomic type of bomb, and 2½ miles from the bigger bomb. In the latter case it can be seen that the lethal range lies well within the area of complete destruction by blast, consequently in this case it can be disregarded as a hazard.

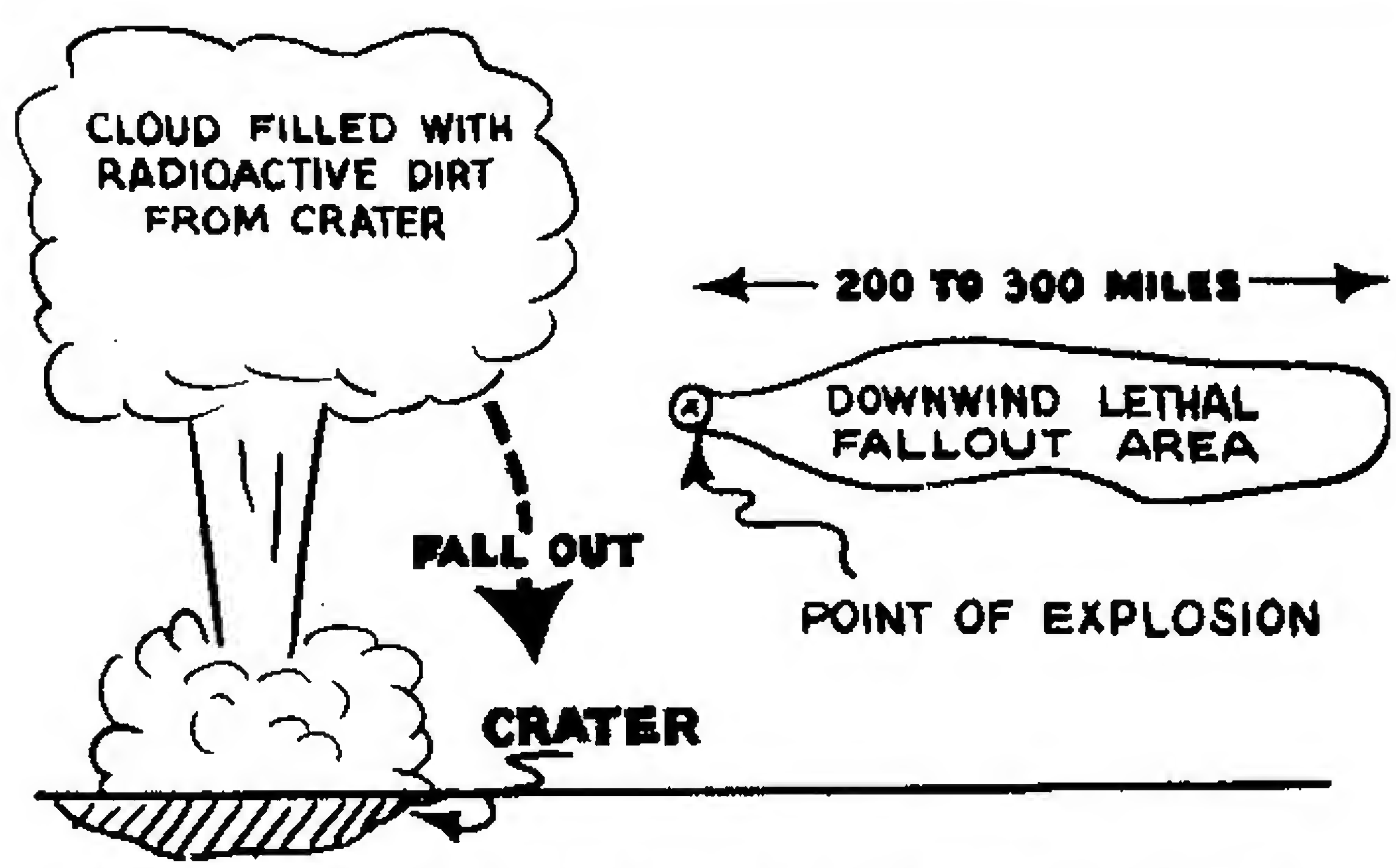
But, if an atomic bomb explodes so that the fireball touches the ground (surface burst) one sustains a radiation fallout problem in addition to the immediate radioactivity because a crater is formed by the force of the explosion. This crater material is



This illustrates the effects of all atomic bomb explosions which radiate in all directions from the centre.



There is considerable difference in hazards and effects between an explosion in the air or on the surface.



A surface explosion causes pulverized material to become radioactive. This creates a radioactive fallout area for many miles.

pulverized, made radioactive, and is sucked up into the mushroom cloud which drifts in a downwind direction depositing radioactive dirt over the countryside. In the case of the H-bomb the area covered by radioactive fallout may extend some 300 miles downwind from the explosion.

This fallout gives off harmful radiation. It is measured by special instruments in numbers of roentgens. A person standing in a fallout area is subjected to radiation at a certain rate and over a period of time accumulates a dose of radiation. The following table illustrates the effects of various accumulated doses of radioactivity on a person.

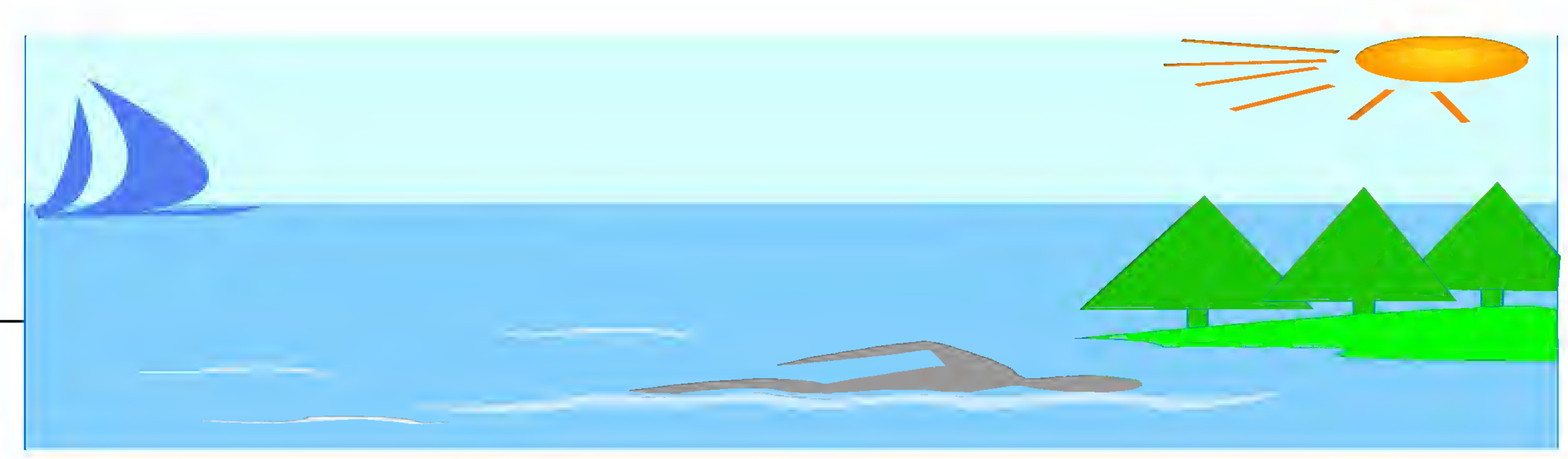
Accumulated dose of	Effect on people
0 to 50 roentgens	no serious effect
50 to 100 roentgens	some injury to blood forming cells
100 to 200 roentgens	some injury to blood forming cells and some disability
200 to 400 roentgens	some disability and some deaths
400 to 500 roentgens	fatal to 50% of people the other 50% ill
600 plus	fatal to most people

In the case of a surface burst H-bomb the radioactive fallout in the fallout area will be of such an intensity to be sufficient to kill unprotected and unprepared people. Fortunately radioactivity decays very quickly, and protection against it is very simple. The following examples show the rate of decay of fallout radioactivity.

If at 1 hour after the explosion the rate is 500 roentgens per hr. then
at 7 hours after the explosion the rate is 50 roentgens per hr. and
at 2 days after the explosion the rate is 5 roentgens per hr. and
at 2 weeks after the explosion the rate is ½ roentgens per hr.

BUILDING PROTECTION

The protection afforded by normally constructed buildings is considerable. The following examples illustrates the protective features for persons in three different types of shelter for a period of 2 days after an atomic explosion where the outside radiation intensity is 500 roentgens per hour, one hour after the explosion.



	Inside radiation reading would be in roentgens per hour	Total accumulated dose in 2 days would be approximately	effect on people
First floor of a wood building	250 R	650 R	lethal
Basement of the same	50 R	135 R	no serious effect
Shelter within basement	1 R	1 R	none

CONCLUSION

The protection of civilian populations in the event of atomic type war presents the civil defense organization with two major problems—the survival of the people who reside in large cities; and the protection of the rest of the population from radioactive fallout. In its simplest terms the survival of people in large cities depends upon evacuation while the survival of the remainder of the population depends on shelters.